

From the Chief Historian

Welcome to our first issue of 2014. This year, we hope we will be able to challenge your preconceptions about NASA history. If you thought it was all about astronauts and the glory days of Apollo, we hope you will notice that the NASA History Program has covered many other topics. We will continue to push those boundaries this year with a purpose in mind.



Within this issue, you will see some of the wide range of topics encompassed by those who work on NASA history in its various forms. From 110-million-year-old dinosaur prints found on the campus at Goddard Space Flight Center to notable 20th-century artists who worked for the National Advisory Committee for Aeronautics (NACA), you are bound to find something you didn't know about our history in this issue. (I certainly did.) We do our best to make sure that we don't just toss one factoid after another at you but instead present an array of interesting, well-researched articles and other information that you will find useful as well as entertaining.

We have the same goal with our publications as well. At the very end of last year, our latest book, *NASA's First A: Aeronautics from 1958 to 2008*, presented a concise overview of the research legacy that NASA has carried forward from its days as the NACA. Our next book in the pipeline takes a very different tack. *Archaeology, Anthropology, and Interstellar Communication* may sound like a very odd title for the History Program, but

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Lankes: Little-Known Artist of the NACA

By Mary Gainer
Historic Preservation Officer at NASA Langley Research Center

The artwork of Julius John Lankes, known as J. J., can be found in various places across NASA Langley Research Center if you know what to look for.

Born in Buffalo, New York, in 1884, Lankes moved to the Hampton Roads area in 1925. Known for his work as an illustrator and woodcut print artist prior to the move, J. J. worked as a draftsman specializing in patent drawings before continuing his education at the Boston Museum of Fine Arts. Lankes made his first woodcut in 1917. He had produced around 800 paintings up to this time, but he considered himself a rather unsuccessful painter. A pamphlet of his work, "J. J. Lankes: Painter-Graver on Wood," was published by Bolton Brown in 1921,¹ followed by a book on Lankes's bookplates, written by Wilbur Macy Stone and published by J. J.'s brother, Frank, in 1922.² In 1923, Lankes began a friendship and artistic collaboration with Robert Frost, one of the best-known 20th-century American poets, a man who would later win a Pulitzer Prize and become the United States Poet Laureate. Lankes produced woodcuts to illustrate Frost's poems as

1 Available from Internet Archive at <https://archive.org/details/jjlankepainter00browgoog> or from Google at <https://play.google.com/store/books/details?id=pKE5AAAAMAAJ&rdid=book-pKE5AAAAMAAJ&rdot=1> (both accessed 7 March 2014).

2 Library of Virginia, <http://www.lva.virginia.gov/exhibits/prints/> (accessed 7 March 2014).

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From the Chief Historian (continued)

we think you will find this collection of essays about the search for extraterrestrial intelligence an enjoyable and thought-provoking read. Later in the year, you will see a monograph on the management of the Spitzer Space Telescope project and several other publications.

If it seems as if I've been harping a bit on the NACA, that is because over the next couple of years, we hope to expand your understanding about when "NASA" history actually began. As a practical matter, the History Program came into existence shortly after the advent of NASA. (Our first Chief Historian, Dr. Gene Emme, was hired in 1959, the year after NASA was created.) However, the History Program has always viewed our primary predecessor agency, the NACA, with a proprietary eye. We've treated the history of NASA as stretching back to the creation of the NACA and tried, as much as possible, to make up for the fact that the NACA did not have a history program of its own. Our backlist of historical publications does a reasonable job of covering the highlights of the 43 years of NACA accomplishments and helps to make up for a remarkable dearth of works published at the time.

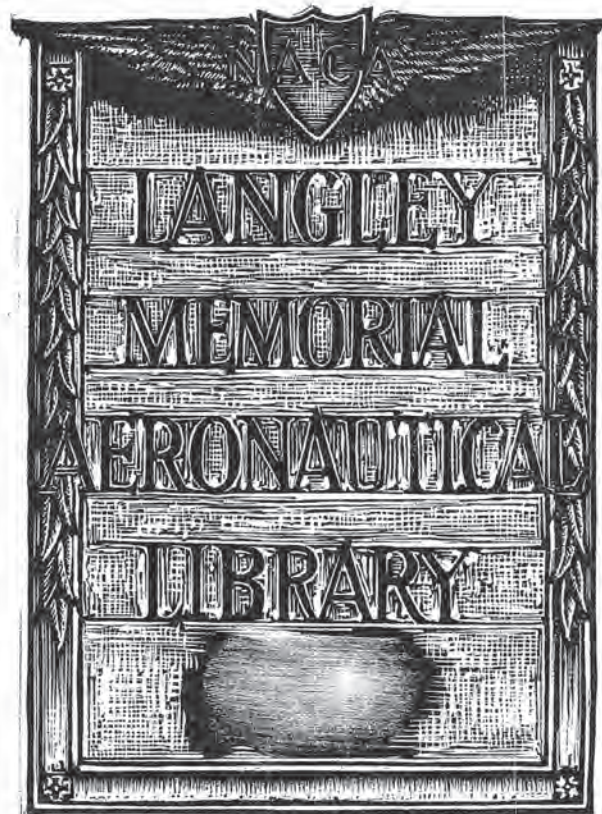
In the run-up to the 2015 centennial of the creation of the NACA, we hope to reacquaint you with the accomplishments of our predecessors and to give you an appreciation for the continuities, and differences, that trace across the century of work at the cutting edge of aerospace research, development, and operations. Black-and-white pictures of Committee members (including Orville Wright) sitting around big wooden tables may seem to have little to do with our current activities on Earth and in space. But the NACA's charge to "supervise and direct the scientific study of the problems of flight with a view to their practical solution" could, with the change of a word or two, describe what we continue to strive for 99 years later. Despite the 10 years of the Apollo program, the long-term continuities over the last century are striking. You'll hear more about that in the coming months.

In the meantime, Godspeed,

A handwritten signature in cursive script, appearing to read "Bill", written in dark ink.

William P. Barry
Chief Historian

Lankes: Little-Known Artist of the NACA (continued)



This bookplate was used in the Langley library.

well as works by other writers, including Beatrix Potter. Public collections of Lankes's work now grace Dartmouth College, Mead Art Museum, the Metropolitan Museum of Art, Virginia State Library, and the Muscarelle Museum of Art at the College of William and Mary.

Upon arriving in Newport News, Virginia, in 1925, Lankes settled with his family in Hilton Village, first at 218 Palen Avenue and later at 306 River Road. Living in Hilton Village seemed to bring out the best in his artwork. He produced around 1,300 woodblock prints, as well as illustrations for commercial production. The *Woodcut Manual*, recently reprinted by the University of Tampa, was a folio-sized volume of 25 prints depicting rural Virginia scenes. Some of his woodcuts of Pennsylvania Dutch barns were published in the *Journal of the American Institute of Architects*.

In 1943, Lankes joined the staff of the NACA as the head of technical illustrating. The 3 July issue of the *Langley Memorial Aeronautical Laboratory (LMAL) Bulletin* announced that J. J. Lankes, well-known artist of Hilton Village, would be instructing college graduates to prepare figures for use in technical reports. The graduates were described as all women who majored in art, coming from the



On the back of this 1948 Christmas party photo is inscribed, "Technical illustrating and reproduction departments with bosses and the 'big chief' Mr. Mison" (head of Reproduction). Lankes is in the upper right. (Photo provided by Lankes family)

University of Kentucky, the University of North Carolina, Columbia University, and Farmville State Teachers College.³

Lankes immediately used his expertise in woodcut prints to design the Laboratory Director's Christmas greeting in the December *LMAL Bulletin*, followed by the New Year's greeting in January.

A few other glimpses into the life of J. J. Lankes at work can be found in the *LMAL* newsletters. Lankes, called "one of the most outstanding woodcut artists of the country" in one newsletter issue, exhibited a group of his works in the hallway of the *LMAL* Administration Building (number 587) in April 1945. The same announcement notified NACA employees that Lankes also had a permanent exhibit at the Virginia Institute of Fine Arts.⁴

Wartime publications for the Laboratory were also graced with Lankes artwork. In June 1944, the NACA issued a special publication defining the purpose of the Laboratory, saying, "The NACA confines its experimental investigations to those requested by the Army and Navy and to fundamental research relating

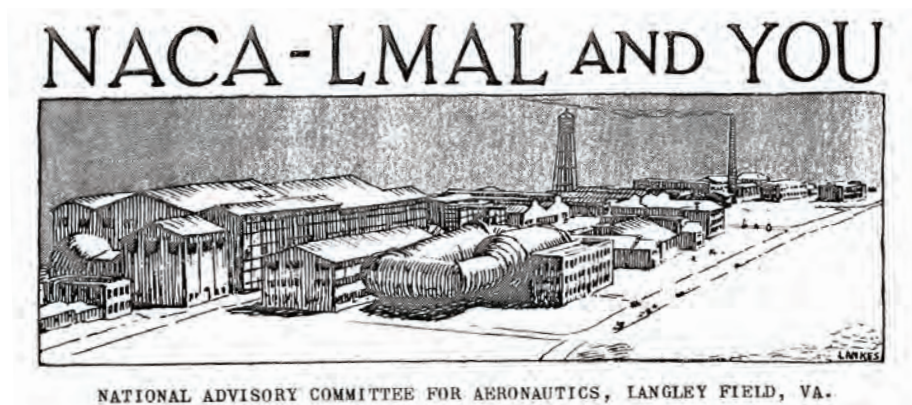
³ "Lankes Working in Reproduction," *LMAL Bulletin* vol. 2, no. 11 (3–9 July 1943): 1, 6.

⁴ "Lankes' Woodcuts To Be Shown Here," *Air Scoop* 4, no. 16 (20 April 1945). Records for the Virginia Institute of Fine Arts, now the Virginia Museum of Fine Arts, show that Lankes was on exhibit 17 February–11 March 1945.



Christmas and New Year's greetings from the Laboratory Director included woodcut prints by Lankes.

to war problems.” Besides a public transportation map of the Lower Peninsula of Virginia drawn by Lankes, a view of the Laboratory was the top banner of the publication. It apparently was given to new employees because the first page includes a block for a person's name to be written in, along with this message: “This booklet has been prepared to help you get acquainted with the Laboratory and the Community. We hope you will find your associations here pleasant and thus will be better able to serve the N.A.C.A. in its important war work. Welcome!” It is signed by H. J. E. Reid.⁵



This banner appeared on a June 1944 publication for new employees. The publication also contained a public transportation map of the area drawn by Lankes.

To be continued in the next issue of News & Notes.

⁵ “NACA-LMAL and You,” June 1944, available online at http://crgis.ndc.nasa.gov/crgis/images/de/1944-06_NACA-LMAL_and_you.pdf (accessed 7 March 2014).

News from Headquarters and the Centers

NASA Headquarters

History Program Office

By Bill Barry

Due to both policy and budget restrictions, 2013 was a year of no conference attendance for the History Program Office. But, due to some fortuitous geography and a slight loosening in the conference restrictions, 2014 started off with a double play for us in the conference game. On 2 January, NASA History was the subject of one of the leadoff panels at the start of the American Historical Association (AHA) Annual Meeting in Washington, DC. The title of the panel was “Aerospace History: Changes in the Field Through the Eyes of AHA Aerospace History Fellows.” It featured 3 of the 28 NASA-AHA Aerospace Fellows, as well as former NASA Chief Historian Sylvia Kraemer (who was responsible for starting the Fellowship). I had the pleasure of joining Sylvia, Margaret Weitekamp (1997 Fellow), Hugh Slotten (1998 Fellow), and Monique Laney (2011 Fellow) as the moderator for the panel. We were also fortunate to have at least one other Fellow in the audience, David Onkst (1999 Fellow). (Apologies if I didn’t spot any other Fellows who may have been in the audience.) While the goal of the panel was to discuss changes in the field of aerospace history since the advent of the Fellowship in 1986, we actually had a wide-ranging discussion on a variety of topics related to the field and the Fellowship. Each of the panelists had very interesting things to say, but what I found particularly fascinating was Dr. Kraemer’s discussion of the backstory of the Fellowship. With roots in her work on the NASA History Advisory Committee dating back to 1980, the Fellowship was one of the three prongs in a deliberate effort to cultivate historical talent at, and for, NASA. (The other two were the start of a documentary reference history that became the Exploring the Unknown series of books and the setting up of an arrangement for publication of NASA histories via the Johns Hopkins University Press.) There were a host of other great anecdotes told and lessons to be learned. The AHA videotaped the panel and many other annual-meeting events. Many videos are posted on the AHA YouTube page (<https://www.youtube.com/playlist?list=PLtafkoYGge2LZ5L-AVy6gBx0G5KOBFDeg>), although at the time of this writing our panel was not yet available.

Before the middle of January, the History Program Office participated in our second conference of the year. The American Institute of Aeronautics and Astronautics (AIAA) held its 52nd Aerospace Sciences Meeting (SciTech2014) at National Harbor, Maryland, 13–17 January 2014. The AIAA History Technical Committee (TC) had organized two panels, both on Monday, 13 January. The morning panel was “Aerospace Archives: All Is NOT Lost—Keepers of the Right Stuff.” This panel included our Chief Archivist, Jane Odom, as well as her professional colleagues from Wright State University, the Massachusetts Institute of Technology,

and the National Air and Space Museum. Later that afternoon, the second history panel was a very interesting collection of diverse papers going under the title “Pioneering Contributions to Aeronautics.” One of the four presenters was Dr. Rob Ferguson, speaking on Short Takeoff and Landing (STOL) research. Rob’s paper was based on his research for NASA’s *First A: Aeronautics from 1958 to 2008*, our latest NASA History book, published at the end of 2013. In addition to a pair of great panels, Monday at SciTech2014 also included a meeting of the AIAA History TC. Outgoing TC Chairman Cam Martin (whose term ends in April) received a plaque in appreciation for his outstanding service as chair. As the incoming chair, I had the pleasure of presenting the plaque to Cam.



On Left: Archives panel; on right: Cam Martin's plaque presentation.

The quarterly lunchtime history speaker series for 2014 kicked off on 6 February, with our good friend Fred Ordway as our guest. Fred gave a tremendous talk about his couple of years working as the technical advisor to Stanley Kubrick on the movie *2001: A Space Odyssey*. His talk was illustrated with behind-the-scenes film clips and his personal photo collection. The enthusiastic audience filled the room and spilled over into an overflow location. We also had 48 people join us virtually for the online Webcast. Our next speaker will be Dr. Andy Jenks of the University of California, Long Beach. Andy was the NASA-AHA Fellow in Aerospace History for 2013–14 and is the author of *The Cosmonaut Who Couldn't Stop Smiling: The Life and Legend of Yuri Gagarin*. He'll be coming to talk to us about the research he did under the Fellowship on international space cooperation on a yet-to-be-determined date in April or early May. Look for announcements on our LISTSERV, on Twitter, and on our Facebook page.

Our spring interns for this year also got off to an early start in January. Andres Almeida is a junior at the University of the District of Columbia majoring in mass communication who is here daily from 8 a.m. to 2 p.m. Andres's previous experience as an intern at Marshall Space Flight Center has been a significant asset. Erin Ammon is a senior at Shepherd University majoring in education. She commutes in from Shepherdstown, West Virginia, to work with us on Tuesdays and Thursdays. Her energy and enthusiasm are amazing—especially considering that she gets on a train at 5 a.m. on the days she works here. Andres and Erin have been doing a great job with our social media outreach, as well as writing longer pieces for us and helping out with a wide variety of ad hoc projects.

Despite the fact that our paper archive and book collection are tucked safely away in a warehouse for the duration of the renovation, our archival team has been keeping very busy. Chief Archivist Jane Odom has taken advantage of the waiting period by pursuing a career-broadening detail with the Office of Human Capital Management (OHCM) here at Headquarters. Her research, analysis, and organizational skills have been a great asset to OHCM. Jane will be back in time to oversee the move back into the renovated reference collection area this summer. Meanwhile, Colin, John, and Liz are in temporary quarters on the second floor of Headquarters. They continue to be busy providing excellent research and reference service and are working their way through processing a number of collections and digitizing materials that were held out of storage. This summer, we will all be pitching in again to get the collection back on the shelves and hope to be ready to open for researchers in August or September. From what we've seen so far, I fully expect that we'll have a much-improved facility and that you'll agree it was worth the work and the wait.

Ames Research Center (ARC)

By Glenn Bugos

The Ames Aeronautical Laboratory (later to be renamed Ames Research Center) was founded on 20 December 1939 as the second laboratory for the NACA, and the Center staff continues to make plans to celebrate its 75th anniversary. Karen Bradford and Kay Twitchell lead the planning, and the biggest event will be an open house. When Ames hosted an open house for its 60th anniversary, more than a 250,000 people showed up. Other events include an Ames family reunion in July in conjunction with the picnic for our interns, the induction of new members to our Hall of Fame, history exhibits traveling to area museums, a month of focused volunteering in our neighboring communities, and colloquia of former Center Directors and Deputy Directors.

I have finished my pictorial history of Ames (SP-2014-4314); Cheryse Triano has finished the design and layout; and it is out for printing bids. It will be on hand for the 75th anniversary celebrations, as well as in electronic form.

Luke Idziak, a spacecraft engineer in the Ames Mission Design Center, published a paper on the historic preservation of artifacts in space, with an intriguing discussion of the CubeSat technologies that could enable orbital museum clusters: "Cultural Resources Management in Outer Space: Historic Preservation in the Graveyard Orbits," *Synesis* (2013): G:61–G:75.

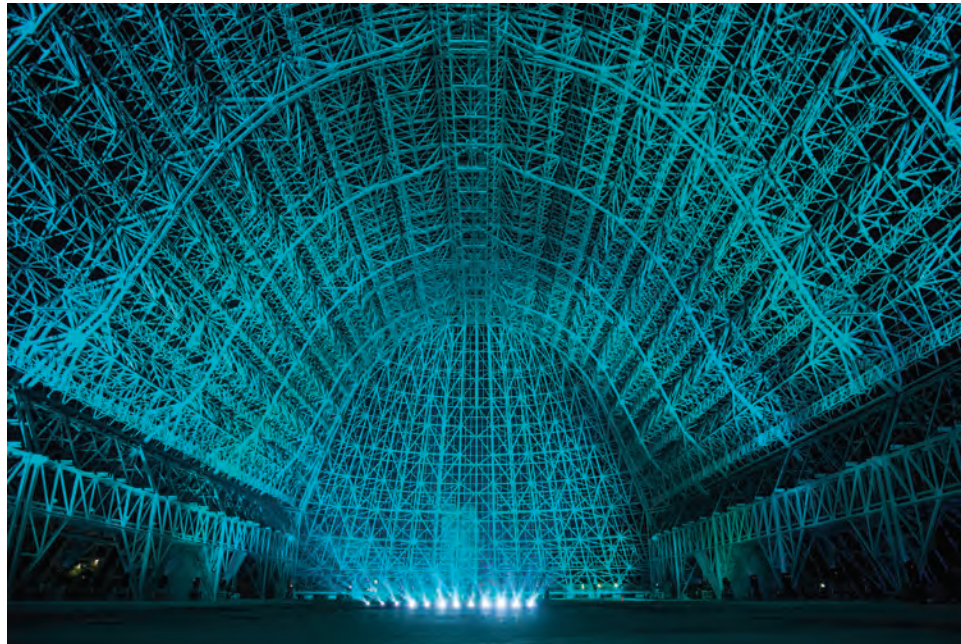
We wish a well-deserved retirement to Roger Ashbaugh, who worked at Ames for more than 40 years and was the longtime manager of exhibits before transitioning into the role of cultural resources management officer and archaeologist. He saw the art in so much of the work at Ames, and he had an impeccable memory of Ames history. We welcome Michael Zero of Lockheed Martin, who helps with the management of the History Office.

Working in the Ames Archives, Mikael Wester completed his internship on digitizing the Galileo papers. Mikael completed 90 metadata records related to recently digitized audiovisual materials (mostly the Hubbard and Pioneer collections), digitized 381 photographs, assembled 22 PDFs, completed 403 metadata records, and preserved 84 photographs. The Galileo and Pioneer Venus materials that have been digitized over the years were deposited with our Code TS for its work in planning new planetary missions. April Gage completed a major update of the metadata guidelines for our digital material and is happy to send it to other NASA archivists for comments or use.

Historic Preservation Officer Keith Venter has begun to work on an Integrated Cultural Resources Management Plan (ICRMP) for the Center, along with contractor AECOM. The ICRMP will serve to compile all previous historic preservation surveys and find holes in past methodologies so that we can develop a comprehensive plan for future studies.



Above: John Greenleaf, seen here in December 2013 accepting an award of the Federal Laboratory Consortium for Technology Transfer for his development of an electrolyte solution, is a retired physician in the Ames Life Sciences Division who recently published a memoir of his career titled *And That's the Way It Was: Memoirs of a NASA Physiologist* (Robertson Publishing, 2013).



Hangar One is shown illuminated for the recent Life Sciences Breakthrough Awards presentation. NASA Ames is currently evaluating bids to lease the hangar and Moffett Federal Airfield.



On 25 January 2014, Ames hosted a memorial tribute for Martin A. Knutson, Director of Flight Operations at Ames from 1970 to 1984, then site manager of the Ames-Dryden Flight Research Facility from 1984 through 1990. He returned to Dryden to manage flight operations from 1990 until his retirement in 1997. Knutson was one of the first U-2 pilots for the Central Intelligence Agency (CIA) and came to Ames in 1970 to fly the U-2 and ER-2 in high-altitude Earth observation missions. Prior to the tribute, the Moffett Museum displayed for his family and friends one of the aircraft Knutson flew.

Armstrong Flight Research Center (AFRC)

By Christian Gelzer

I was increasingly drawn into activities related to the change of the Center's name from Dryden Flight Research Center to Neil A. Armstrong Flight Research Center. These included supplying historical information on Hugh Dryden and Neil Armstrong, attending planning meetings and drafting articles for publication, and discussing the display of artifacts large and small.

I also participated in a daylong meeting (which included the Center Director) as Armstrong Flight Research Center hosted senior members of the California Science Center who visited to discuss aircraft loans, exhibits, artifacts, and opportunities for a possible presence at the new Samuel Oschin Air and Space Center, where Space Shuttle Endeavour will be permanently housed.

At this writing, *The Spoken Word: Recollections of Dryden History, the Shuttle Years* is arriving from the press; copies will be sent to each Center history office or point of contact. The third in the series of published oral histories from Dryden, this edition celebrates the Center's role in the Space Shuttle Program, something that spans far more than just the 30 years in which the Shuttles flew into space.

Glenn Research Center (GRC)

By Anne Mills

Glenn Research Center celebrated the 50th anniversary of the first successful launch of Centaur on 27 November. Responsibility for the program was transferred from Marshall Space Flight Center to Lewis Research Center (now Glenn) in 1962, thanks to Lewis's early expertise in the use of liquid hydrogen as a propellant. Research and testing at Lewis resulted in the successful launch of the upper-stage rocket needed for the Surveyor program. To this day, the Centaur upper stage is used to send payloads into the universe.

On 25 October, Joe Nieberding and former Center Director Larry Ross, both Centaur program directors, presented "The Centaur Story" to a standing-room-only crowd. The crowd was captivated as the pair gave an insider's account of how the program developed that included many new (and often humorous) anecdotes. The presentation was filmed for future availability.

A gala celebration was held at the Great Lakes Science Center on 22 November. Hundreds of former Centaur program employees reminisced about the program and heard from former GRC Directors Andy Stofan and Larry Ross, as well as NASA Associate Administrator Robert Lightfoot. The following day, a special Centaur anniversary space day was held at the Glenn Visitor's Center, with displays and interactive lessons to help families learn about this important part of American space history.

Jet Propulsion Laboratory (JPL)

By Erik Conway

During the past few months, I have been working to finalize my manuscript, “JPL and the Exploration of Mars.” After another round of peer review and revision, it has been accepted for publication by Johns Hopkins University Press, and a publication contract is in the works.

The next installment of our video documentary on JPL's history, entitled *The Stuff of Dreams: JPL and the Beginnings of the Space Age*, is finished. It premiered at the California Institute of Technology's (Caltech's) Beckman Auditorium on 19 February and examines Bruce Murray's tenure as Director of JPL, a period in which planetary exploration suffered from political disinterest, if not hostility, and a consequent lack of funding. We're also beginning work on the next installment, covering (very roughly) Lew Allen's tenure from 1982 to 1990.

During the past year, I have worked on a project to document JPL's most significant technical achievements. I presented some of the results to a technologists' retreat last fall in Pasadena. In November, at the Keck Institute for Space Studies, I also presented my research on Theodore von Kármán's role in fostering rocketry at both the Guggenheim Aeronautical Laboratory at the California Institute of Technology (GALCIT) and the Physics Department at Caltech.

Craig Waff's history of the Deep Space Network (DSN), written in the early 1990s but never published, was reviewed by some longtime DSN engineers to assess its suitability for posthumous publication. Those reviews were very positive, and I am now retyping the manuscript so that it can be edited.

Julie Cooper and I hosted a visit by a group of former JPL employees and Nathalia Holt, a postdoctoral scholar and science writer from Boston. Holt spent a week at the JPL Archives, researching and interviewing “computers”—a group of women otherwise known as the Computing Section. These women worked at JPL from the 1940s until they were replaced by mechanical computers. Several of them learned computer programming and stayed at JPL, and two former computers still work at the Lab. Nathalia contacted 14 women about being interviewed, and they gathered in Pasadena. They visited JPL for a morning tour, and in the afternoon, Julie displayed archival documents and photos to the group on a big screen. There was also an informal “Meet the Computers” gathering (with about 45 people attending), during which the women reminisced about their education, their work at JPL, and how they combined job and family in the 1950s and 1960s. For more information about the computers, please see <http://www.jpl.nasa.gov/news/news.php?feature=1327> and <https://pub-lib.jpl.nasa.gov/docushare/dsweb/Services/Document-801>.

Johnson Space Center (JSC)

By Rebecca Wright

JSC historian Jennifer Ross-Nazzal worked with the crews of the *Makers: Women Who Make America* franchise, who are partnering with PBS and AOL for new 1-hour documentaries. She provided background information and served as an on-camera expert for the segment on women and space that traces the history of female pioneers in the U.S. space program. Producers used the JSC Oral History Project Collection as a resource for this project. Scheduled to be featured in *Makers: Women & Space* are aviators Wally Funk and Jerrie Cobb; Eileen Collins, the first woman to pilot a spacecraft; classmates Shannon Lucid, Rhea Seddon, and Kathryn Sullivan from the first class of female astronauts; Mae Jemison, the first African-American female astronaut; and Peggy Whitson, the first female commander of the International Space Station (ISS). The program ends with the next generation of female engineers, mathematicians, and astronauts. The documentary is scheduled to air 1 July 2014.

The JSC History team finalized its report on the Commercial Crew and Cargo Program Office (C3PO) and its Commercial Orbital Transportation Services (COTS) partners. From late 2005 until October 2013, a small team housed at Johnson Space Center led an effort for NASA to partner with the private sector to provide resupply services to the ISS. Rebecca Hackler served as the lead writer on the C3PO publication, which will be released later this spring.

JSC recently completed the historic mitigation of the retirement of two specific assets that had supported the U.S. Space Shuttle Program: 1) Shuttle Carrier Aircraft (SCA) N905NA and N911NA and 2) the two solid rocket booster (SRB) retrieval ships Freedom Star and Liberty Star. The Center submitted its final Historic American Engineering Record (HAER) Level III Documentation to the National Park Service for submission to the Library of Congress. As part of the mitigation process, the JSC History team worked with the JSC Historic Preservation Officer to gather information, conduct oral history interviews, and assist in the research efforts for videos produced that serve as brief historical narratives of the two assets. These videos are part of NASA's Space Shuttle Recordation Web site. For more information, see <http://www.nasa.gov/content/shuttle-carrier-aircraft-recordation/> and <http://www.nasa.gov/content/srb-retrieval-ships/>.

Also, the Shuttle Carrier Aircraft N905NA was transferred to Space Center Houston, JSC's visitor center, and will be used as part of the display with the orbiter mockup recently named Independence. The SCA is being dismantled for transport to Space Center Houston and is scheduled to open to the public in February 2015. (For more information, visit <http://spacecenter.org/the-shuttle-and-747-carrier/>.)

Marshall Space Flight Center (MSFC)

By Mike Wright

Fifty Years Ago, Fifth Saturn Launch Inspired NASA, MSFC, and Public

Fifty years ago, on 15 April 1964, the *Marshall Star* newspaper featured the headline “A Saturn Date To Remember.” The headline came in a special “Saturn Souvenir” section of the *Star* marking the successful launch of the fifth Saturn I rocket on 29 January 1964.

The *Marshall Star* editor filled the special section of the paper with the images of dozens of letters and telegrams to Dr. Wernher von Braun, the first MSFC Director. One published handwritten note came from an 80-year-old space enthusiast. “Dear Dr. Von Braun: I congratulate you and the space team for the excellent work in designing and constructing the Saturn rocket.”

The Saturn I vehicle was the first in a series of Saturn launch vehicles that Marshall developed in preparation for the launch of the crewed Apollo missions. The record included 10 successful Saturn I launches that paved the way for the larger Saturn IB launch vehicle and, eventually, the Saturn V rocket that launched the Apollo 11 astronauts to the surface of the Moon.

Space historian Roger Bilstein, author of *Stages to Saturn, a Technological History of the Apollo/Saturn Launch Vehicles*, recounted the details related to the launch of the fifth Saturn. Bilstein wrote that the launch of SA-5 on 29 January was what NASA liked to call “a textbook launch.” As the first Block II Saturn vehicle, the SA-5 recorded a number of firsts: first S-IV stage to fly, first guidance and control packages, and first successful stage separations. The SA-5 was the first Saturn using uprated engines, marked the first successful recovery of motion-picture camera pods, and was the first orbital Saturn launch vehicle.

Bilstein’s work also reveals that the decision to launch the SA-5 vehicle demonstrated a remarkable amount of courage within NASA. Bilstein reported that in a countdown test for the all-systems vehicle on 24 January 1964, the vehicle exploded. NASA officials investigated the failure and concluded that the explosion had been caused by an over-pressurized liquid oxygen tank. Despite the explosion, NASA officials decided to go ahead with the launch but played special attention to the liquid-oxygen tank pressures during countdown.



SA-5 launch on 29 January 1964.

Stennis Space Center (SSC)

By Daphne Alford

A diverse group helped to record the history of John C. Stennis Space Center through the Mississippi Oral History Program when the University of Southern Mississippi (USM) partnered with the Stennis Space Center History Office. Former Center Directors and employees, former business and community leaders, and former residents shared their memories during the creation of what was known then as the Mississippi Test Operations (MTO).

Thirty individuals participated in the oral history project, which was conducted by USM faculty and staff members. The first interview took place in 1980, with MTO's Deputy Director, Henry Auter. Most of the interviews took place during the 1990s in different locations. At age 96, Mrs. J. W. Hover was interviewed along with her 73-year-old daughter, Mrs. J. R. Boutwell, at their home in Pearlington, Mississippi, in 1993. Both were former residents of Napoleon, Mississippi. MTO's first manager, Captain William C. "Bill" Fortune, recorded his oral history via telephone from his home in California. He was 82 years old in 1993, when he discussed with interviewer Charles Bolton the first time he met his boss, Wernher von Braun.

Stennis Space Center's first public affairs officer and historian Mack Herring talked about his first writing assignment from von Braun while working at Marshall Space Flight Center in Huntsville, Alabama. His interview was conducted by Steven Patterson on 23 April 1992. Below is an excerpt from his oral history:

Mr. Patterson: Well, what about [Dr. Wernher] von Braun's style. What kind of writing style did he prefer from you, something simple?

Mr. Herring: ...The first article I ever wrote for von Braun was for a magazine about building a colony on the moon. I'll tell a slight anecdote here because I had only been working there [Marshall Space Flight Center] for a week when I got that assignment. So when I went in to talk to Dr. von Braun, you know, he welcomed me to the Marshall Center, he was a very warm, very friendly man. He liked to bear hug you, put his arms around you and you know. He asked me if I had ever read any science fiction. I told him I had and he said, "Well, that's all this is. You just want to let your imagination go wild and don't worry about thinking about things that we can't do. Generally, what man can see he can accomplish." In fact, he used the expression, he said, "Our future thinkers here try to look ahead about 25 years. We try to keep our planning about 25 years in advance. Still, the way technology progresses, we will still be about 10 years short. Whenever we're working at 25 years in the future, we'll be 10 years short on man's actual accomplishments." I never will forget the first time whenever I got that assignment I went out, and he gave me a list of all of the future planners he had there at the Marshall Center. He said, "Go talk to these people

and get their ideas. You put them down and you write them and bring them back.” So I did and as I was talking to these various future planners and thinkers that he had, like [Ernst] Stuhlinger, people that were thinking about going to Mars and all.

Mr. Patterson: Were most of these Germans?

Mr. Herring: Yes, yes. In fact, I think most of them were German[,] particularly Dr. Stuhlinger, who was the top future planner. I got back and I said, “My Lord, I have really made a mistake coming up here. This stuff is just not real. These people are talking about going to the moon and Mars like it’s going across the street, like it’s just old hat and they are going to do it.” The biggest thing is they talked with such confidence about what they were going to do that you felt that they didn’t see any problem with going to the moon. That was the thing that really astonished me. But when I finished that article and Dr. von Braun read it, sent it back without any changes. He just put a little note on it that said, “Great job, Mack, keep up the good work.” So I went around with the big head. A lot of my colleagues, you know, were bragging about what a good job it was.¹

Among the participants in the project were businessmen Roy Baxter and Leo W. Seal, Jr.; rice farmer L. L. Fletcher; Center Directors Jerry Hlass and Roy Estess; Hancock County Supervisor Alton D. Kellar; Corps of Engineers land negotiator William Matkin; and Senator John C. Stennis’s assistant, William “Bill” Spell.

Twelve of the 29 oral histories of the Mississippi Oral History Program collection are now featured on the Oral History Web page at <http://www.nasa.gov/centers/stennis/about/history/oral-history.html>.

¹ Transcript available at <http://www.nasa.gov/sites/default/files/files/MackHerring.pdf> (accessed 7 March 2014).

Paleontology: Perhaps a New Area of Concern for NASA Cultural Resources Management

By the Goddard Space Flight Center Public Affairs Office

Cretaceous Footprints Found at Goddard

Not one but two nodosaurs passed through the campus of NASA's Goddard Space Flight Center (GSFC) in Greenbelt, Maryland, between 110 and 112 million years ago, a U.S. Geological Survey (USGS) paleontologist confirmed.

The second track, overlapping the first, looks to be from a juvenile, perhaps following and sniffing along after, said Rob Weems, emeritus paleontologist and stratigrapher with the USGS, from Reston, Virginia. "It's definitely a track."

He confirmed the track to be a nodosaur footprint while visiting GSFC on 23 August 2012 at the invitation of Center officials. He also discovered the second track while clearing and excavating the stone plate that contained the first print. Nodosaurus were a type of heavily armored plant eater, as heavy as small elephants. The name is derived from the many spikes, or nodes, in their armor.

"It looks to be a manus print of a much smaller dinosaur than the first one, but it looks to be the same type," Weems said of the second track. The manus is the front foot of a quadrupedal animal, while the pes is the back foot. "If the one that came through was a female, it may have had one or more young ones following along. If you've seen a dog or cat walking with its young, they kind of sniff around and may not go in the same direction [as the adult], but they end up in the same place."

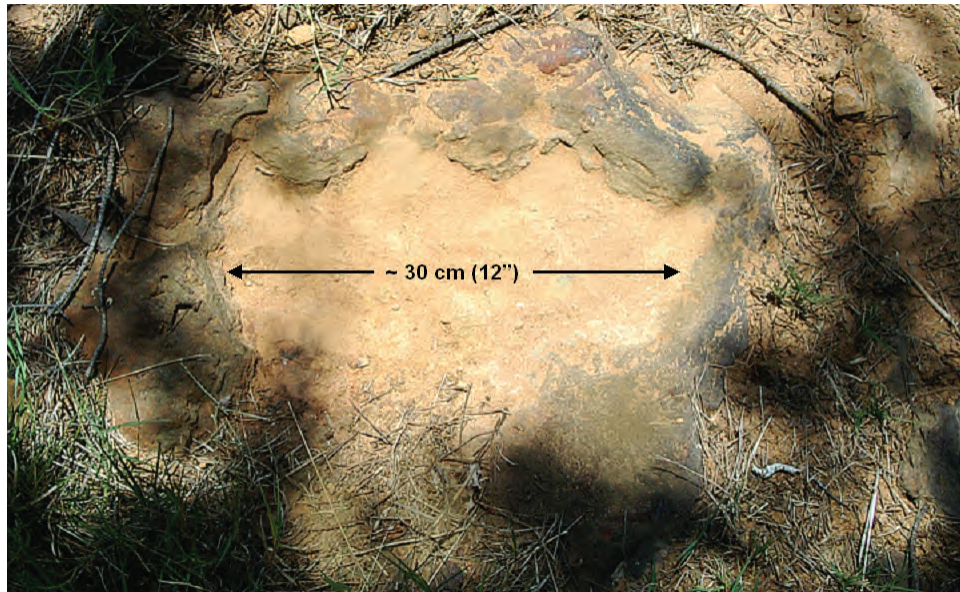
The tracks had to have been made around the same time, at least within the same day, said Ray Stanford, an amateur dinosaur tracker who discovered the "momma" track during the summer of 2012. The smaller track shows signs of pushing up the still-wet mud that the larger footprint had hollowed out.

Goddard Cultural Resources Program Manager Alan Binstock said the next steps will be to have the site analyzed to determine whether further excavation is called for and to extract and preserve the existing footprints.

About 110 million light-years away, the bright, barred spiral galaxy NGC 3259 was just forming stars in dark bands of dust and gas. Here on the part of Earth where NASA's Goddard Space Flight Center would eventually be built, a plant-eating dinosaur sensed predators nearby and quickened its pace, leaving a deep imprint in the Cretaceous mud.

On Friday, 17 August 2012, noted dinosaur hunter Ray Stanford shared the location of that footprint with Goddard's facility management and the *Washington Post* newspaper.

"This was a large, armored dinosaur," Stanford said. "Think of it as a four-footed tank. It was quite heavy; there's a quite a ridge or push-up here.... Subsequently the sand was bound together by iron oxide or hematite, so it gave us a nice preservation, almost like concrete."



Print of the right rear foot of a nodosaur apparently moving in haste as the heel did not fully settle into the Cretaceous mud. (Source: Ray Stanford and Dr. Robert Weems)

Stanford, a "proud amateur dinosaur tracker," has had several papers published, including one about the discovery of a new species of nodosaur from a fossilized hatchling found near the University of Maryland in College Park. He had previously confirmed the authenticity of this track with David Weishampel of Johns Hopkins University in Baltimore, author of the book *Dinosaurs of the East Coast*.

He had material from the same Cretaceous-era sedimentary rock, which the USGS helped to date to approximately 110 to 112 million years old by analyzing pollen grains sealed in the stone. The Cretaceous Period ran between 145.5 and 65.5 million years ago, and it was the last period of the Mesozoic Era.

NASA will not release the exact location of the footprint, and because the footprint is on federal land, improperly removing it could potentially violate three laws: the Antiquities Act, the Archaeological Resources Protection Act, and the Paleontological Resources Preservation Act. NASA officials will next consult with the state of Maryland and paleontologists to form a plan for documenting and preserving the find, Binstock said.

Stanford also identified and presented several smaller footprints—from three-toed, flesh-eating theropods—to Goddard officials from the same site. He called the location of the find “poetic.”

“Space scientists may walk along here, and they’re walking exactly where this big, bungling, heavy-armored dinosaur walked, maybe 110 to 112 million years ago,” Stanford said.

You can read the *Washington Post* story online at http://www.washingtonpost.com/national/health-science/dinosaur-age-meet-the-space-age/2012/08/17/76c176f4-e89a-11e1-8487-64e4b2a79ba8_story.html.

Other Aerospace History News

National Air and Space Museum (NASM)

By Mike Neufeld

Roger Launius (Associate Director for Collections and Curatorial Affairs and Space History Division), John Krige (Georgia Institute of Technology [Georgia Tech]), and Jim Craig (Georgia Tech) have coedited *Space Shuttle Legacy: How We Did It and What We Learned* (American Institute for Aeronautics and Astronautics, October 2013). The book includes chapters on the spaceplane concept, the politics of building the Space Shuttle, anomalies, and the Shuttle’s role in building the International Space Station.

After 30 years of Space Shuttle operations—40 years, if one includes the research and development period of the 1970s—what is the legacy of the Space Shuttle? That is the question the book seeks to answer, focusing on the history of the Space Shuttle by delving deeply into various aspects of the program’s evolution over its long duration. This book originated at the time of the July 2011 completion of the successful 135th and final mission of the Space Shuttle. Vigor Yang, chair of the School of Aerospace Engineering at Georgia Tech, and James I. Craig, emeritus professor in the school, who has a special interest in the place of the Space Shuttle in the development of space technology, envisioned a collection of essays that would assess the place of the Shuttle in American history. With administrative support and funding from NASA, the Boeing Company, and Georgia Tech, they hosted a symposium called “The Space Shuttle: An Engineering Milestone” in 2011 to recognize the technological accomplishments of the many individuals involved in the program and to involve aerospace engineering students in the commemoration. The symposium offered a beginning point for assessing the legacy of the Space Shuttle over its more-than-30-year career, and a variety of contributors engaged in first-rate proceedings that focused on the technical lessons learned from the program. Yang and Craig followed this up in 2012 by recruiting historians Roger D. Launius

and John Krige to edit a book along with Craig that would undertake a broader evaluation of the program.

Michael Neufeld (Space History) has completed the editing of *Milestones of Space: Eleven Iconic Objects from the Smithsonian National Air and Space Museum* (Smithsonian National Air and Space Museum, in association with Zenith Press, forthcoming in May 2014). This illustrated coffee table book includes essays by Space History curators and Massachusetts Institute of Technology and Johns Hopkins scholars. Michael Neufeld also presented a talk in November at Washington & Jefferson College, Washington, Pennsylvania, titled “Von Braun: Dreamer of Space, Engineer of War.”

Three Space History staff members participated in the Smithsonian’s Stars 2013–14 lecture series in the NASM Einstein Planetarium: David DeVorkin, who gave his talk, “Oh, Swear by the Inconstant Sun,” on 7 December 2013; Michael Neufeld, “First Mission to Pluto: The Origins and Voyage of New Horizons,” 14 December 2013; and Jennifer Levasseur, “On-Orbit Observing: An Astronaut View of Our Universe,” 8 February 2014. Members of the NASM Center for Earth and Planetary Studies and of the Smithsonian Astrophysical Observatory gave other lectures. This lecture series features Smithsonian scientists and historians lecturing during wintertime Saturdays at 5:45 p.m. in the Einstein Planetarium on astronomically related topics. If the weather cooperates, telescopes are available afterward for public observing outside the museum at the Phoebe Haas Public Observatory.

At the annual conference of the American Astronomical Society (AAS) in National Harbor, Maryland, David DeVorkin was a key organizer of a Historical Astronomy Division Special Session on 5 January 2014, “From Barnard’s Star to the Kepler Mission: Searching for Low Mass Companions to Stars.” The session was divided into two sections consisting of two panels of speakers who are leaders in the development of the technologies that finally were sensitive enough to detect extrasolar planets: the radial velocity technique and the transit technique. Each speaker provided insights into what made it possible for them to detect extrasolar planets and planetary systems or what prevented their detection prior to success. It was a collective discussion, the intent of which was to identify key technological issues and key conceptual issues that had to be overcome in order to finally be able to say, “Yes, planetary systems exist beyond the solar system.” Key artifacts were identified for possible accession into the NASM collection. DeVorkin also spoke in Herzlia, Israel, at the Ninth Ilan Ramon Annual International Space Conference on 29 January; his talk was entitled “Science with a Vengeance, or Exploring the Sun from High Places—the Pyrenees to Skylab.”

James David (Space History) published “Can We Finally See Those Records? An Update on the Automatic/Systematic Declassification Review Program,” *American Archivist* 76, no. 2 (fall/winter 2013): 415–437.

Call for Papers: Federal History

By Peter Knupfer

Federal History (FH), the journal of the Society for History in the Federal Government, is calling for papers for its January 2015 issue. FH examines all aspects of U.S. government history, as well as innovative work done in federal public history. FH is a peer-reviewed academic journal published in print and online. The journal is indexed by Ebscohost, and the editors welcome articles from both federal historians and those in academia. For more information, visit the Web site at <http://shfg.org/shfg/publications/federal-history-journal/>.

Recent Publications and Online Resources

NASA Publications

NASA Aeronautics

By Jennifer Kennedy

Four new titles have been published in the NASA Aeronautics Book Series. All books are available for digital download at <http://www.nasa.gov/connect/ebooks/>.

Sweeping Forward: Developing and Testing the Grumman X-29A Forward Swept Wing Research Aircraft, by Frederick A. Johnsen. The X-29 was an unusual aircraft with a truly unique silhouette. It combined many features that challenged the technologies of its day and represented special problems for the developers and testers responsible for documenting its features and design goals. This book is a look at the “big picture” of what this team accomplished in a fast-paced test program involving truly unique aircraft.

Thinking Obliquely: Robert T. Jones, the Oblique Wing, NASA's AD-1 Demonstrator, and Its Legacy, by Bruce I. Larrimer. This book chronicles the history of the initial oblique-wing program, which ran from 1976 through 1982. This program was a joint effort between NASA's Ames Research Center and Dryden Flight Research Center, thus giving rise to the aircraft's name: Ames-Dryden (AD-1) Oblique Wing Research Aircraft.

Quieting the Boom: The Shaped Sonic Boom Demonstrator and the Quest for Quiet Supersonic Flight, by Lawrence R. Benson. This work explores the story of this plane and provides a general history of sonic boom research, emphasizing the associated people and organizations. The Shaped Sonic Boom Demonstrator culminated four decades of study and research on mitigating the strength of sonic booms.

A New Twist in Flight Research: The F-18 Active Aeroelastic Wing Project, by Peter W. Merlin. In the 21st century, advances in materials and adaptive control technologies have allowed aeronautical researchers to revisit the wing-warping control technique pioneered by the Wright brothers and to take a small step toward the development of wings with a birdlike capability for changing shape to optimize efficiency. This new concept, now known as the Active Aeroelastic Wing (AAW), is a synergistic technology that integrates air vehicle aerodynamics, active controls, and structures to maximize aircraft performance.

NASA Human Exploration and Operations

By David Lengyel

The Human Exploration and Operations Mission Directorate (HEOMD) Integrated Risk and Knowledge Management Team has developed an innovative set of knowledge capture and transfer products that document lessons learned from across NASA. There are three online modules: 1) Columbia accident investigation processes, 2) Ares I-X Flight Demonstration Project, and 3) Space Shuttle Program Transition and Retirement. Each module contains a report crafted from research and personal interviews, as well as related videos and relevant documents. These products are integrated into a multimedia resource suite that provides a comprehensive and efficient transfer of critical knowledge to HEOMD personnel, partners, and stakeholders. Also available publicly is a module on Knowledge-Based Risks (KBRs) that documents lessons learned from risks encountered during many human and robotic spaceflight missions, covering how the risk was identified, how it was mitigated, what worked, and how the risk was tracked from a cost and schedule perspective. Finally, two multimedia risk-management case studies, which reinforce validated risk-management practices used for the Space Shuttle Super Light Weight Tank Project and the Disaster Assistance and Rescue Team (DART) Project, are available. These case studies may be taught in an instructor-led environment.

- Columbia Investigation Lessons Learned Module: <http://www.nasa.gov/externalflash/CAIB/>
- Ares I-X Lessons Learned Module: <https://nsckn.nasa.gov/Database/166/ARES%20I-X/index7.html>
- Shuttle Transition and Retirement Lessons Learned Module: https://nsckn.nasa.gov/Database/166/Shuttle_Transition/index7.html
- Knowledge-Based Risks Module: <http://www.nasa.gov/externalflash/kbrs/>
- DART Risk Management Case Study: <http://www.nasa.gov/externalflash/dart/>
- SSP Super Light Weight Tank Risk Management Case Study: <http://www.nasa.gov/externalflash/irkm-slwt/>

Commercially Published Works

Compiled by Chris Gamble

Multimedia

NPR American Chronicles: Exploring Space (audiobook, audio CD), by National Public Radio (NPR) and read by Joe Palca (HighBridge Company, August 2013). From the competitive spirit ignited by Sputnik to the tragedies and triumphs of the Apollo missions, from the technological leap forward created by the Space Shuttle to the global cooperation forged by the International Space Station and beyond, NPR examines the inspirational story of modern space exploration and the extraordinary individuals who made it possible. The audiobook features in-depth profiles of landmark missions, along with interviews and commentary from those who have lived the dream, including astronauts John Glenn, Neil Armstrong, Buzz Aldrin, Bernard Harris, Sally Ride, and many more.

ZENIT—The Original AIS News Magazine on the Soviet Space Programme (CD-ROM), by Astro Info Service (Halesowen, West Midlands, United Kingdom, 2013). The magazine collected and distributed the latest information and historical revelations on the Soviet space program. A small group of enthusiasts volunteered their time and knowledge to produce *Zenit*, which grew in popularity. Contributions to the magazine came from across the world and not only provided informative accounts of current operations but also remembered historic events and projected the future aims of the Soviet space program. Leading contributors included Phil Clark, Rex Hall, Brian Harvey, Phil Mills, James Oberg, and Andy Salmon. The CD contains all *Zenit* issues (in PDF format) published by Astro Info Service from June 1985 through December 1992, totaling 64 issues with 2 additional supplements; *Zenit* 65, the spring 2013 commemorative special edition; *The Soviet Cosmonaut Detachment 1960–1985*, by Rex Hall and Dave Shayler, a collection of brief biographies and background information commemorating 25 years of the cosmonaut team; and an index of authors, issues, and topics.

Books

Apollo 13 Owners' Workshop Manual: An Engineering Insight into How NASA Saved the Crew of the Crippled Moon Mission, by David Baker (Haynes Publishing, United Kingdom; Zenit Press, United States; October 2013). On 13 April 1970, Apollo 13 suffered a near-catastrophic explosion. The planned lunar landing was called off, and the new challenge was to get the crew safely back to Earth. When the carbon dioxide in the three astronauts' exhaled breath threatened to asphyxiate them, the crew improvised a filter device, which had been tested in Mission Control, to make the air breathable. Only hours before hurtling back into the atmosphere, they powered up the Apollo spacecraft again—not knowing if it had been fatally damaged in the explosion. Here is the inside story of how a potential disaster became NASA's finest hour, told by a

member of the team working in Mission Control during the crisis to ensure the astronauts' safety.

Around Clear Lake, by Ruth Burke (Rebecca Collins Arcadia Publishing, November 2013). With the arrival of the Manned Spacecraft Center in the early 1960s, the Clear Lake Area became the center for cutting-edge technology and space travel. Numerous aerospace contracting firms and other high-tech enterprises soon followed, giving the area one of the highest concentrations of aerospace expertise in the nation. Nine distinct cities make up what is referred to as the "Clear Lake Area." From east to west along the north shore are Seabrook, El Lago, Taylor Lake Village, Nassau Bay, Houston, and Webster. From west to east on the south shore are League City, Clear Lake Shores, and Kemah. The lake feeds into Galveston Bay, creating a waterfront lifestyle with the third-largest boating community in the United States.

An Astronaut's Guide to Life on Earth, by Chris Hadfield (Random House Canada, October 2013). As commander of the International Space Station, Chris Hadfield captivated the world with stunning photos and commentary from space. Now, in his first book, Hadfield offers readers extraordinary stories from his life as an astronaut.

Earth from Space, by Yann Arthus-Bertrand (Abrams, November 2013). Views from above can provide telling information about the health of our planet. To help us understand the more than 150 breathtaking satellite photographs in this book, Yann Arthus-Bertrand, an aerial photographer and environmental activist, discusses the impact of deforestation, urban sprawl, intensive farming, ocean pollution, and more. This book's compelling selection of satellite images raises important questions about our future while also showcasing the planet's beauty.

Earth, Spirit of Place: Featuring the Photographs of Chris Hadfield, edited by John McQuarrie (Magic Light Publishing, November 2013). Astronauts on board the International Space Station have many tasks, but a consistent favorite is taking photographs of Earth. The ISS astronauts don't just take digital images randomly. The photos they shoot are part of a well-defined program of data collection coordinated through the Crew Earth Observations team at Johnson Space Center. The database of astronaut photography is freely accessible via the Internet and has made this book possible. The reader will also find Chris Hadfield's artful tweets enlivening captions of his images. Complementing his photos are a number of NASA satellite shots captured by various orbital platforms over the last few years.

Freedom 7: The Historic Flight of Alan B. Shepard, Jr., by Colin Burgess (Springer-Praxis, October 2013). Inevitably, there are times in a nation's history when its hopes, fears, and confidence in its own destiny appear to hinge on the fate of a single person. One of these pivotal moments occurred early on the morning of 5 May 1961, when a 37-year-old test pilot squeezed himself into the confines of the tiny Mercury spacecraft that he had named Freedom 7. On that historic day, U.S. Navy Commander Alan Shepard carried with him the hopes, prayers,

and anxieties of a nation as his Redstone rocket blasted free of the launch pad at Cape Canaveral, hurling him upward on a 15-minute suborbital flight that also propelled the United States into the bold new frontier of human space exploration. This book tells the enthralling story of that pioneering flight as recalled by many of the participants in the Freedom 7 story, including Shepard himself.

GPS Declassified: From Smart Bombs to Smartphones, by Richard D. Easton and Eric F. Frazier (Potomac Books, Inc., October 2013). The book examines the development of the Global Positioning System (GPS) from its secret Cold War military roots to its emergence as a worldwide consumer industry. Drawing on previously unexplored documents, the authors examine how military rivalries influenced the creation of GPS and shaped public perceptions about its origin. Since the United States' first program to launch a satellite in the late 1950s, the nation has pursued dual paths into space—one military and secret, the other scientific and public. Among the many commercial spinoffs this approach has produced, GPS arguably boasts one of the greatest impacts on our daily lives.

History of Flight: From Leonardo's Flying Machine to the Conquest of Space, by Riccardo Niccoli (White Star Publishers, October 2013). From humanity's first hopeful attempts to achieve liftoff to the era of jets, superfighters, and Space Shuttles, this fascinating volume captures the magic and science of flight. Magnificently illustrated, it moves forward chronologically, with each chapter dedicated to a specific type of aircraft or event, including wartime aviation and the birth of commercial airlines. Entertaining anecdotes and a section on technology round out this comprehensive history.

History of Rocketry and Astronautics, vol. 40, edited by Christophe Rothmund (American Astronautical Society [AAS] History Series, vol. 40; International Academy of Astronautics [IAA] History Symposia, vol. 28; AAS/Univelt, Inc., October 2013). These are the proceedings of the 43rd History Symposium of the International Academy of Astronautics, held in Daejeon, Republic of Korea.

Incoming Asteroid! What Could We Do About It? by Duncan Lunan (Springer, 30 November 2013). Lately, there have been an increasing number of news stories on objects from space—such as asteroids, comets, and meteors—whizzing past Earth. What if we knew there would be an impact in 10 years' time? What could we do? The author and his colleagues set out to explore how they could turn aside a 1-kilometer-diameter rock asteroid within this 10-year timescale. Having set themselves this challenge, they identified the steps that might be taken, using technologies that are currently under development or proposed. They considered an uncrewed mission, a followup crewed mission, and a range of final options, along with ways to reduce the worst consequences for humanity if the impact could not be prevented.

It Came from Outer Space Wearing an RAF Blazer!: A Fan's Biography of Sir Patrick Moore, by Martin Mobberley (Springer, August 2013). To British television viewers, the name Patrick Moore has been synonymous with astronomy and space travel

since he first appeared on *The Sky at Night* in 1957. To amateur astronomers, he has been a source of inspiration, joy, and humor, as well as an eccentric role model, since that time. Most people know that his 55 years of presenting *The Sky at Night* is a world record, but what was he really like as a person? What did he do away from the TV cameras, in his observatory, and within the British Astronomical Association—the organization that inspired him as a youngster? Also, precisely what did he do during the war years, a subject that has always been shrouded in mystery? Martin Mobberley, a friend of Patrick Moore's for 30 years and a former president of the British Astronomical Association, has spent 10 years exhaustively researching Patrick's real life away from the TV cameras. His childhood, Royal Air Force (RAF) service, tireless voluntary work for astronomy and charity, and endless writing are all examined in detail. His astronomical observations are also examined in unprecedented detail, in addition to the battles he fought along the way and his hatred of bureaucracy and political correctness.

LEGO Space: Building the Future, by Peter Reid and Tim Goddard (No Starch Press, October 2013). Explore an incredible LEGO universe. Spaceships, orbital outposts, and new worlds come to life in this unique vision of the future, built completely from LEGO bricks. A selection of step-by-step building instructions will have you constructing your own cosmic creations to play with at home. Marvel at interstellar battle cruisers, space pirates, charming robots, and other stunning builds from an amazing future!

Meeting the Challenge: The Hexagon KH-9 Reconnaissance Satellite, by Phil Pressel (AIAA, November 2013). This book tells the recently declassified story of the design, development, production, and operation of the Hexagon KH-9 reconnaissance satellite, which provided invaluable photographic intelligence to the U.S. government and stands as one of the most complicated systems ever launched.

Meteorological Satellite Systems, by Su-Yin Tan (Springer, November 2013). This book reviews historic developments and recent technological advancements in geostationary orbiting and polar-orbiting meteorological satellites. It will explore the evolution of these remote sensing technologies and their capabilities to monitor short- and long-term changes in weather patterns in response to climate change. This title provides a ready and quick reference for information about meteorological satellites.

Military Application of Space: The Indian Perspectives, by R. K. Singh (VIJ Books, Pty. Ltd., India, January 2014). This book focuses on the relevance of space as a new domain with regard to enhancing war-fighting capabilities and delves at length into the Chinese space program and its military exploits. Apart from militarization, the Chinese continue to develop ways to weaponize space to gain asymmetric advantages over the much stronger and technologically advanced American capabilities. The book discusses existing and future military exploitation of space assets by India and highlights the necessity and urgency of Indian antisatellite weapons (ASATs) to counter the threat from Chinese ASATs.

Orbit of Discovery: The All-Ohio Space Shuttle Mission, by Don Thomas (University of Akron Press, December 2013). Don Thomas, a Cleveland native, saw other Ohioans in space and set his sights on becoming an astronaut. After years of hard work and dedication, he became part of the 1995 All-Ohio Space Shuttle Discovery mission—STS-70. *Orbit of Discovery* provides a firsthand account of this mission. Written by Thomas with the assistance of journalist Mike Bartell, the book is a lively and entertaining must-read.

Partnership in Space: The Mid to Late Nineties, by Ben Evans (Springer-Praxis, August 2013). This latest entry in the History of Human Space Exploration mini-series by Ben Evans continues with an in-depth look at the mid- to late nineties, starting after *Tragedy and Triumph in Orbit: The Eighties and Early Nineties*. The narrative follows the path taken by two old foes toward an unlikely and often controversial partnership. As the Shuttle Program recovered from the loss of Challenger and pursued ever-loftier goals, including the ambitious repair of the Hubble Space Telescope, Mir suffered from economic collapse and political neglect. Yet both Mir and the Shuttle formed a fertile ground upon which the seeds of what would become today's International Space Station were sown. Both the United States and Russia acutely needed the support of the other to achieve their goals. As political relations thawed between the two superpowers, a new relationship was forged. This cooperation saw Russians flying aboard the Shuttle and Americans flying aboard Mir, creating a partnership that endures to this day.

Solar System Maps: From Antiquity to the Space Age, by Nick Kanas (Springer-Praxis, September 2013). This book tells the exciting story of how humanity has conceptualized and mapped our solar system from antiquity to modern times. In addition to the complete text, this story is made more vivid by 162 solar system and planetary maps, diagrams, and images; direct quotes and figures from antiquarian, contemporary, and Space Age documents and photographs that allow the reader to track how we have viewed the solar system from original sources; and nine tables that compare the various world views, relative planetary positions, and components of the solar system with each other. Broad in scope and rich in imagery, this book will draw the reader into the story of our solar system and how it has been mapped since the beginning of recorded time.

Space Operations: Experience, Mission Systems, and Advanced Concepts, edited by Michael Schmidhuber, Craig A. Cruzen, and Joachim Kehr (Progress in Aeronautics and Astronautics Series, AIAA, December 2013). This book is a collection of materials presented at the 12th SpaceOps Conference, held in Stockholm, Sweden, in June 2012. From the almost 300 papers presented and discussed at the conference, those selected for this volume represent a cross section of three main subject areas: mission preparation and management—mission design, development, and planning; data and communications—the infrastructure needed on the ground, from antennas to software, in order to communicate with and retrieve data from spaceborne resources; and mission execution—a focus on the aspects of specific space missions during preparation for flight and throughout operations.

Space Shuttle Legacy: How We Did It and What We Learned, by Roger D. Launius, John Krige, and James I. Craig (AIAA, September 2013). In this book, a group of highly qualified experts including historians, political scientists, public administrators, engineers, and scientists have combined to answer the question, what is the legacy of the Space Shuttle? They examine key aspects of the program, including its long history, its successes and failures, and what lessons it offers to those engaged in current or future spaceflight programs.

Stratonauts: Pioneers Who Ventured into the Stratosphere, by Manfred “Dutch” Ehrenfried (Springer-Praxis, December 2013). *Stratonauts* chronicles humankind’s quest for ever-higher altitudes from ancient times to the present. It pays tribute to those who have lost their lives attempting to reach the stratosphere over the past several centuries.

This Is Mars, edited and designed by Xavier Barral, photographs by NASA/Mars Reconnaissance Orbiter (Aperture, October 2013). *This Is Mars* offers a previously unseen vision of the Red Planet. Located somewhere between art and science, the book brings together for the first time a series of panoramic images recently sent back by the Mars Reconnaissance Orbiter. Conceived as a visual atlas, the book takes the reader on a fantastic voyage—plummeting into the breathtaking depths of the Valles Marineris canyons; floating over the black dunes of Noachis Terra; and soaring to the highest peak in our solar system, the Olympus Mons volcano. The search for traces of water also uncovers vast stretches of carbon ice at the planet’s poles.

Wheels Stop: The Tragedies and Triumphs of the Space Shuttle Program, 1986–2011, by Rick Houston (University of Nebraska Press, December 2013). Humanity’s first reusable spacecraft and the most complex machine ever built, NASA’s Space Shuttle debuted with great promise and as a dependable source of wonder and national pride. But with the Challenger catastrophe in 1986, the whole Space Shuttle Program came into question, as did NASA itself, an institution that had been seemingly above reproach. *Wheels Stop* tells the story of how, after the Challenger disaster, the Space Shuttle not only recovered but went on to perform its greatest missions. From the Return to Flight mission of STS-26 in 1988 to the final Shuttle mission, STS-135, in 2011, *Wheels Stop* takes readers behind the scenes as the Shuttle’s crews begin to mend Cold War tensions with the former Soviet Union, conduct vital research, deploy satellites, repair the Hubble Space Telescope, and assist in constructing the International Space Station. It also tells the heart-wrenching story of the Columbia tragedy and the loss of the STS-107 crew.

The History Program Office gives sincere thanks to volunteer Chris Gamble, who compiles this section for us every quarter. Please note that the descriptions have been derived by Chris from promotional material and do not represent an endorsement by NASA.

Upcoming Meetings

The 45th Lunar and Planetary Science Conference will be held **17–21 March 2014** in Texas. Please see <http://www.hou.usra.edu/meetings/lpsc2014/> for more details.

The annual meeting of the National Council on Public History will be held **19–22 March 2014** in Monterey, California. Please see <http://ncph.org/cms/conferences/2014-annual-meeting/> for more details.

The annual meeting for the Society for History in the Federal Government will be held **4–5 April 2014** in Shepherdstown, West Virginia. Please see <http://shfg.org/shfg/events/annual-meeting/> for more details.

“Embattled Heavens: The Militarization of Space in Science, Fiction, and Politics” will be held **10–12 April 2014** at Freie Universität Berlin, Germany. Please see <http://www.heavens.geschkult.fu-berlin.de> for more details.

The annual meeting for the Organization of American Historians will be held **10–13 April 2014** in Atlanta, Georgia. Please see <http://www.oah.org/meetings-events/> for more details.

The annual meeting for Oral History in the Mid-Atlantic Region will be held **24–25 April 2014** in Philadelphia, Pennsylvania. Please see <http://ohmar.org> for more details.

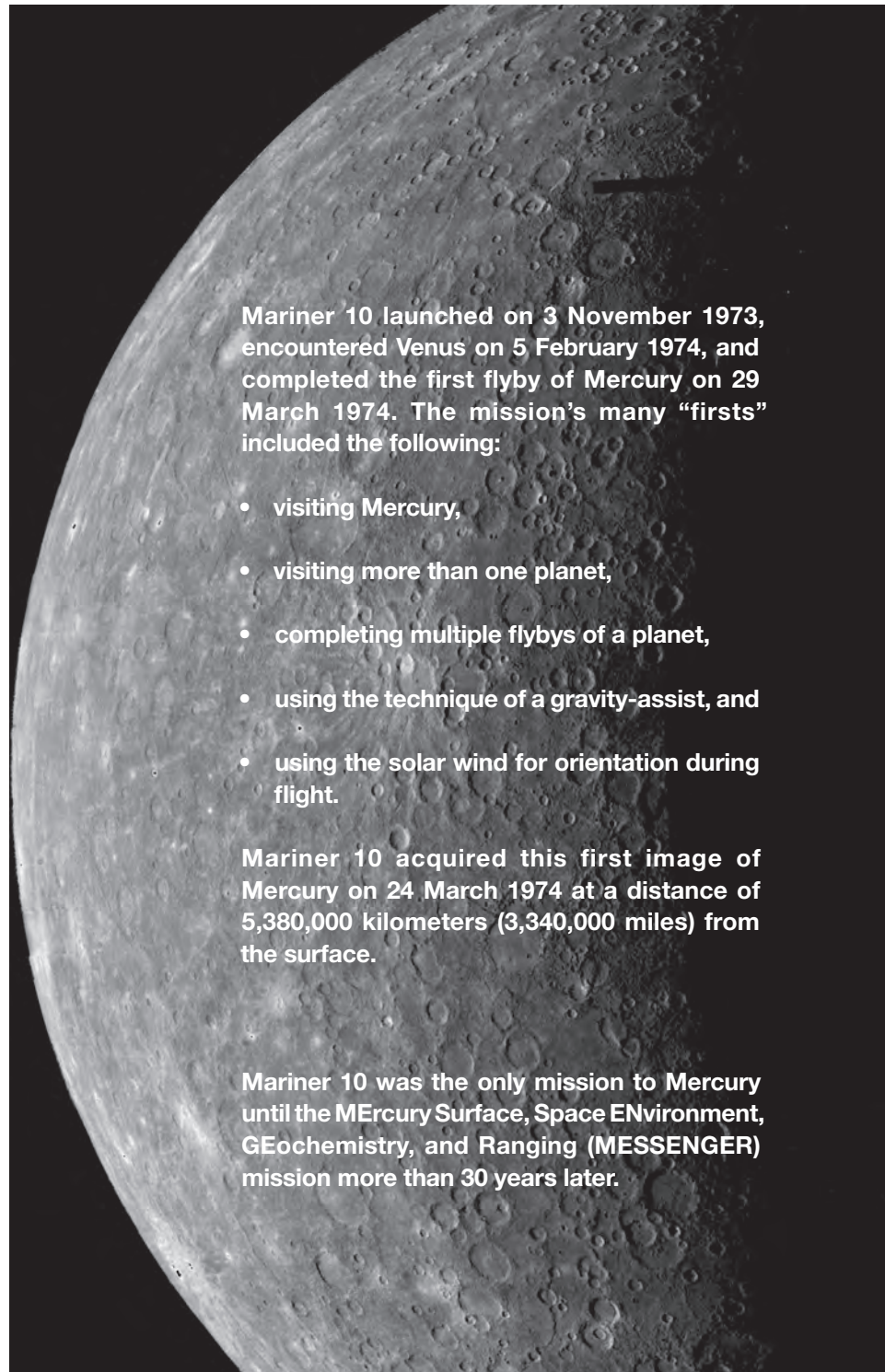
The 33rd International Space Development Conference (ISDC 2014) will be held **14–18 May 2014** in Los Angeles, California. Please see <http://isdc.nss.org/2014> for more details.

The 30th National Space Symposium will be held **19–24 May 2014** in Colorado Springs, Colorado. Please see <http://www.spacesymposium.org> for more details.

The 224th meeting for the American Astronomical Society will be held **1–5 June 2014** in Boston, Massachusetts. Please see <http://aas.org/meetings/aas224> for more details.

The joint meeting for the Council of State Archivists, the National Association of Government Archives and Records, and the Society of American Archivists will be held **10–16 August 2014** in Washington, DC. Please see <http://www2.archivists.org/conference> for more details.

Image in Aerospace History



Mariner 10 launched on 3 November 1973, encountered Venus on 5 February 1974, and completed the first flyby of Mercury on 29 March 1974. The mission's many "firsts" included the following:

- visiting Mercury,
- visiting more than one planet,
- completing multiple flybys of a planet,
- using the technique of a gravity-assist, and
- using the solar wind for orientation during flight.

Mariner 10 acquired this first image of Mercury on 24 March 1974 at a distance of 5,380,000 kilometers (3,340,000 miles) from the surface.

Mariner 10 was the only mission to Mercury until the MErcury Surface, Space ENvironment, GEochemistry, and Ranging (MESSENGER) mission more than 30 years later.

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We also welcome comments about the content and format of this newsletter. Please send your comments, as well as any changes to your mailing address or requests to stop receiving *News and Notes* in the mail, to Giny Cheong, newsletter editor, at giny.cheong@nasa.gov.

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